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with many of the books which have been issued for students of a higher grade than those technically for children. The facts brought forward are those usually taught only in books for the higher grades, but they are presented in such a way as to be equally intelligible to "children," with the farther advantage that the significance of the detail is never lost sight of — an advantage inestimable in its results. In the headings to the chapters, too, the author has displayed great ingenuity, and the results are not open to such criticism as may be directed toward those of some popular books and articles on botanical subjects.

The most unsatisfactory features of the book are the illustrations. They are too coarse to convey the idea desired in most cases, and the grace and delicacy of most of the plants figured have been lost entirely.

We feel that the teacher in California who attempts to realize from "nature study" in the lower grades that which is hoped for from it, will find a way pointed out by this book which is both clear and certain, and that the teachers in other states will realize their need of a similar book and find much assistance by using it and adapting it to their local needs.

W. A. SETCHELL.

**Van Tieghem's Eléments de Botanique.**[1] — While the first volume of this text-book, as would be expected from the author's many important contributions to vegetable anatomy and morphology, presents a clear and sound statement of this part of botany, the second volume, in the present edition, merits special mention as being the first readily accessible synopsis of the vegetable kingdom in which the dicotyledonous flowering plants are classified according to their seed and ovule structure along the line laid down by Professor Van Tieghem in a series of articles published some two years ago.[2]

Excluding the Nymphæaceæ, which, with the Gramineæ, he places in a class considered as being exactly intermediate between the Monocotyledons and Dicotyledons, the author divides the latter into two subclasses, Insemineæ and Semineæ, the first destitute of detachable seeds at maturity of the fruit, and the second bearing seeds. The first of these is then divided into groups marked by the presence or absence of transient ovules (which, when present, are homologized with carpellary leaflets, the embryo sac otherwise originating in the tissues of the simple carpel), and both subclasses are further subdivided according to the number and character of their ovule coats, while the ultimate grouping of families, though to a certain extent dictated by grosser characters, is influenced largely by the results reached in late years by the students of systematic plant anatomy.

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[1] Van Tieghem, Ph. *Eléments de Botanique.* Troisième édition. Paris, Masson et Cie., 1898. 2 vols., 12 mo. i. Botanique générale. ii. Botanique spéciale.

[2] Van Tieghem. Sur les Phanérogames sans graines, formant le groupe des Inséminées, *Comptes Rend.* 124: 22 mars–3 mai, 1897.

As might be expected, the sequence of families is greatly modified from that which represents the conclusions of the English and German schools, though of the two it naturally conforms more closely to the latter, by which a more consistent effort has been made to represent phylogenetic affinities as indicated by anatomical as well as more obvious structure.

Whatever may be the general verdict on the new basis of primary classification and its present exemplification, — and it is likely to find more opponents than supporters, — the author is to be congratulated on having presented his views in a suggestive and convenient form for the guidance of future investigators; and the attempts which are sure to be made both to strengthen and overthrow it by the histological taxonomists can but result in laying further foundation stones for a truly natural system of the flowering plants. T.

**Are Bacteria Fungi?** — In *Centralblatt f. Bakteriologie*, etc., 2te. Abt., Bd. iii, Nos. 11 and 12, Dr. Johan-Olsen argues that bacteria are simply one stage in the development of fungi and supports his text, Zur Pleomorphismusfrage, with two well-drawn plates. Unfortunately, some of his most striking examples are drawn from species of Oospora which mycologists for many years have classed as fungi, and whose only claim to be classed as bacteria is the fact that when their extremely tenuous hyphæ break up into conidia, or oidia, the latter closely resemble rod-shaped bacteria in size and form. These conidia, however, grow into genuine branched mycelia. Some of the other cases which he cites, *e.g.*, branched tubercle and diphtheria bacilli, may well be involution forms, as Dr. Migula has suggested, since they are usually found only in old cultures, sparingly, and under conditions unfavorable to the organism. More difficult to explain is his account of the change of the mycelium of *Dematium casei* into bacteria bearing endospores, the germination of which spores he succeeded in witnessing. Possibly Dr. Ol. Johan-Olsen was working with mixed cultures. Much is said of Dr. Brefeld's *System*, but if Dr. Johan-Olsen's culture methods are not a very decided improve-